FCC IWG-***NINE!***
WRC-99

Meeting Notice and Draft Agenda

The sixth meeting of FCC's informal working group ***NINE!*** on Regulatory/Procedural Matters will convene at 9:30 a.m., Thursday, September 3rd in Room 847, 2000 M Street, NW, Washington, DC.

The draft agenda:

1. Approval of agenda
2. Introductions
3. Draft minutes, July meeting
4. Government views, Ap S3
5. Res 128
6. Other business

Mark your calendars. Subsequent meetings of ***NINE!*** are:

10/1	11/5	12/3	1/7/99	2/4
3/4	4/1 (Honest!)	5/6	6/3	7/1

at 9:30 a.m., above room.

Ms. Regina M. Keeney
Chief of the International Bureau
Federal Communications Commission
Washington, D.C. 20554

Dear Ms. Keeney:

NTIA, on the behalf of the Executive Branch Agencies, has developed and approved additional U.S. Preliminary Views. Our Radio Conference Subcommittee drafted preliminary view for agenda items 1.2, 1.3, 1.6.1, and 1.13. Three preliminary views concern agenda item 1.6.1. The RCS also reviewed and revised (using redline/strikeout) preliminary views drafted by the FCC WAC (FCC Public Notice DA 98-1044, June 3, 1998) that address agenda items agenda items 1.11, and 2. Karl Nebbia from my staff will contact Damon Ladson to coordinate FCC/NTIA agreement on these views.

Sincerely,

William T. Hatch
Acting Associate Administrator
Office of Spectrum Management

UNITED STATES

DRAFT PRELIMINARY VIEWS ON WRC-00

WRC-00 AGENDA ITEM 1.2: *to finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66 (Rev. WRC-97) and the decisions of WRC-97 adoption of new values, due to take effect at a future time, of spurious emissions for space services;*

ISSUE: Revision of Appendix S3, spurious emissions for space services and radar systems.

BACKGROUND: Recommendation No. 66 (Rev. WRC-97) directs the ITU-R to submit a report to WRC-99[00] with a view to finalizing the space services spurious emissions limits in Appendix S3 of the Radio Regulations. The current RR text lists space services spurious emissions as design objectives that will become limits if not changed by the next WRC. Current studies show that these limits are achievable.

Furthermore, modifications to Appendix S3 made at WRC-97 could be wrongly interpreted in two provisions pertaining to radar systems. First, the limits on systems installed on or before 1 January 2003 were not intended to apply to radars; however, the wording in Section 1, paragraph 6 could be read as applying the limits to radars. Second, Section 2, paragraph 8 indicates that the e.i.r.p. measurement method can be used when it is not possible to measure the power applied to the antenna transmission line. Because there are many radar systems where the antenna attenuates the spurious signals, measurement of the power applied to the antenna transmission line may be "possible" but not "appropriate." For this reason, common practice is to measure all radars using the e.i.r.p. method and should be indicated in the Appendix.

U.S. PRELIMINARY VIEW: The United States supports removal of the "design objectives" designation from the space services spurious emissions limits given that the limits and reference bandwidth remain as agreed at WRC-97.

Furthermore, it supports modification to Appendix S3 to make it clear that no limits apply to radar systems installed on or before 1 January 2003 and that the e.i.r.p. method can be used on radars.

WRC-00 AGENDA ITEM 1.3: *to consider the results of ITU-R studies in respect of Appendix S7/28 on the method for the determination of the coordination area around an earth station in frequency bands shared among space services and terrestrial radiocommunication services, and to take the appropriate decision to revise this Appendix;*

ISSUE: The revision of Appendix S7.

BACKGROUND: Appendix S7 provides the method for determining the coordination area around an earth station. The appendix has not been updated in many years, though changes have been made to the associated recommendations (ITU-R Recommendations IS. 847-850). Work in TG1/6 is aimed at 1) updating the system characteristics that are used; 2) considering new approaches to handling new propagation information and other probabilistic factors; and 3) extending the frequency range to which the recommendations apply. In the past, propagation and probabilistic factors have been lumped together. TG1/6 is currently considering methods to separate these aspects. Though Appendix S7 has been successfully used for years, the separation of the factors may lead to rejection of the probabilistic component and lead unnecessarily to larger coordination areas.

U.S. PRELIMINARY VIEW: The United States supports the updating of Appendix S7 using the improved techniques given in ITU-R Recommendations IS. 847-850 as a basis, by using updated system characteristics, and by extending the frequency range upward. However, the United States is concerned about the progress of the work of TG1/6 in certain areas. New approaches for dealing with propagation and other probabilistic components may lead to an unnecessary increase in the size of coordination areas, the existing method having produced useful results for many years. Also, the United States has not seen a benefit to extending the frequency range below 1000 MHz.

While, in general, the United States supports the use of ITU-R Recommendation 847 to update Appendix S7, the recommendation, in the context of transportable equipment, may not be properly applied near land boundaries between administrations.

WRC-00 Agenda Item 1.6.1: *review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary;*

ISSUE: Possible bands for the allocation of additional spectrum for the terrestrial component of IMT-2000.

BACKGROUND: IMT-2000 defines 3rd generation wireless systems providing worldwide telecommunications services regardless of location, network, or terminal used. Integrated terrestrial mobile and mobile satellite systems will provide different types of wireless access on a global basis. Key features are high degree of commonality of design, compatibility of services, high quality, small pocket terminal with worldwide roaming capability, and capability for multi-media applications.

The bands 1885-2025/2110-2200 MHz are intended for use worldwide by administrations wishing to implement IMT-2000 (RR S5.388 and RES 212 (Rev. WRC-97), around the year 2000. Impacting the common spectrum available worldwide for IMT-2000 is the existing use of the IMT-2000 bands by

fixed, mobile and mobile-satellite services.

Recommendation ITU-R M.687-2 states that terrestrial IMT-2000 may be able to share band allocations with fixed and possibly other services only where there is suitable geographic separation between services, or where neither service requires the total allocation bandwidth. This recommendation also points out that sharing is not feasible with the space science or radio astronomy services.

Contributions to the March 1998 TG8/1 meeting indicate some interest in the following bands as extension bands for the terrestrial component: 470-866 MHz, 869-915 MHz, 925-960 MHz, 1350-1400 MHz, 1427-1527 MHz, 1668-1690 MHz, 1710-1785 MHz, 1805-1920 MHz, 1945-1980 MHz, 2025-2110 MHz, 2200-2300 MHz, 2360-2670 MHz and 2700-3400 MHz.

PRELIMINARY VIEW: Additional spectrum required (if demonstrated) for IMT-2000 may be fulfilled in existing fixed and mobile bands currently used for cellular, personal communication system (PCS), commercial mobile radio service (CMRS) as an evolutionary process. The U.S. supports regulatory flexibility to permit the migration from pre-IMT-2000 systems to IMT-2000. The U.S. opposes allocations for bands where radiolocation, radionavigation (including aeronautical radionavigation), radionavigation-satellite, space services and passive services are primary or secondary, given that there exists a general consensus that IMT-2000 will not be able to share with these services and TG8/1 has no plans for performing sharing studies. Furthermore, the U.S. opposes band segmentation and refarming of bands where there are existing services.

WRC-00 Agenda Item 1.6.1: *review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary;*

ISSUE: Possible bands for allocation of additional spectrum for the satellite component of IMT-2000.

BACKGROUND: IMT-2000 defines 3rd generation wireless systems providing worldwide telecommunications services regardless of location, network, or terminal used. Integrated terrestrial mobile and mobile satellite systems will provide different types of wireless access on a global basis. Key features are high degree of commonality of design, compatibility of services, high quality, small pocket terminal with worldwide roaming capability, and capability for multi-media applications.

The bands 1885-2025/2110-2200 MHz are intended for use worldwide by administrations wishing to implement IMT-2000 (RR S5.388 and RES 212 (Rev. WRC-97), around the year 2000. The portions 1980-2010/2170-2200 MHz are allocated to MSS worldwide, potentially for the satellite component of IMT-2000 (RR S5.389A). Internationally, non-IMT-2000 MSS systems are likely to use these MSS allocations thereby reducing the amount of spectrum available on a worldwide basis for the satellite component.

Contributions to the March 1998 TG8/1 meeting indicate some interest in the following bands as extension bands for the satellite component: 1525-1559/1626.5-1660.5 MHz, 1610-1626.5/2483.5-2500

MHz, 1559-1567/part of 1675-1690 MHz, 1660.5-1668.4 MHz and 2500-2535/2655-2690 MHz. Some of these bands are already allocated to MSS.

PRELIMINARY VIEW: Additional spectrum requirements (if demonstrated) for the satellite component of IMT-2000 may be fulfilled in the existing MSS allocations around 1-3 GHz, taking into account the spectrum requirement for other types of MSS services. The U.S. opposes allocations for bands where radiolocation, radionavigation (including aeronautical radionavigation), radionavigation-satellite, space services and passive services are primary or secondary, given that there exists a general consensus that IMT-2000 will not be able to share with these services and TG8/1 has no plans for performing sharing studies. However, the U.S. view regarding the 1559-1567 MHz band is stated in the preliminary view for Agenda Item 1.9. Furthermore, the U.S. opposes band segmentation and refarming of bands where there are existing services.

WRC-00 Agenda Item 1.6.1: *review of spectrum and regulatory issues for advanced mobile applications in the context of IMT-2000, noting that there is an urgent need to provide more spectrum for the terrestrial component of such applications and that priority should be given to terrestrial mobile spectrum needs, and adjustments to the Table of Frequency Allocations as necessary;*

ISSUE: Additional spectrum requirements for the terrestrial and satellite components of IMT-2000.

BACKGROUND: IMT-2000 defines 3rd generation wireless systems providing worldwide telecommunications services regardless of location, network, or terminal used. Integrated terrestrial mobile and mobile satellite systems will provide different types of wireless access on a global basis. Key features are high degree of commonality of design, compatibility of services, high quality, small pocket terminal with worldwide roaming capability, and capability for multi-media applications.

WARC-92 identified 240 MHz for worldwide use by Administrations wishing to implement IMT-2000 (RR S5.388 and RES 212 (Rev. WRC-97), around the year 2000. 2x30 MHz of that was allocated to MSS worldwide, potentially for the satellite component of IMT-2000 (RR S5.389A). Existing fixed, mobile and mobile satellite services use portions of the bands identified for IMT-2000 implementation, thus impacting the common spectrum available worldwide for IMT-2000.

Contributions to the TG8/1 April meeting indicate a requirement for additional worldwide and regional spectrum (Europe-Terrestrial 120 MHz). In the U.S., a 1994 PCIA survey estimated 235 MHz of additional spectrum. The U.S. contribution, a 1998 PCIA survey, was used by TG8/1 to develop an example calculation of additional spectrum required for an ITU-R Draft New Recommendation. The U.S. estimates for the year 2010 could reach 250 MHz, for total of around 500 MHz required for IMT-2000. In a similar draft new recommendation on satellite spectrum requirements, an example based on U.S. traffic data in year 2010 estimates 2x33 MHz of additional spectrum.

PRELIMINARY VIEW: If the need for additional spectrum for IMT-2000 is demonstrated, the U.S. may support some additional spectrum for the 2005-2010 timeframe, amount to be determined and subject to appropriate sharing studies.

WRC-00 Agenda Item 1.11: *to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions No.* ***214*** ***(Rev.WRC-97)*** *and* ***219*** ***(WRC-97);*** ~~Resolutions 214, 219 and 728 (WRC-97) -- *To consider constraints on existing allocations and additional allocations on a world-wide basis for the non-GSO/MSS below 1 GHz. (WAC/024(22.05.98))*~~

ISSUE: Allocation below 1 GHz to NGSO MSS downlinks at 405-406 MHz.

BACKGROUND: At WRC-97, the U.S., World Meteorological Organization (WMO), and other countries drafted Resolution 219 (WRC-97) calling for a study of the possible allocation of the 405-406 MHz band for MSS at WRC-99. The 401-406 MHz band is currently allocated to the Meteorological Aids Service. ITU-R studies are ongoing to determine the feasibility and cost of transitioning the Meteorological Aids Service out of the 405-406 MHz band.

PRELIMINARY VIEW: The U.S. ~~should pursue~~is considering an allocation in the NVNG MSS in the 405-406 MHz band pending the results of ITU-R studies. A possible transition plan and a date by which MetAids could migrate from the 405-406 MHz and NVNG MSS operations could commence are yet to be established. In order to protect SARSAT (406-406.1 MHz) and Radio Astronomy (406.1-410 MHz) bands from NVNG MSS out-of-band emissions, a 30 to 50 kHz guard band near the upper band edge may be required.

WRC-00 Agenda Item 1.11: *to consider constraints on existing allocations and to consider additional allocations on a worldwide basis for the non-geostationary (non-GSO) MSS below 1 GHz, taking into account the results of ITU-R studies conducted in response to Resolutions No.* ***214*** ***(Rev.WRC-97)*** *and* ***219*** ***(WRC-97);*** ~~Resolutions 214 and 219 (WRC-97) -- *To consider constraints on existing allocations and additional allocations on a world-wide basis for the non-GSO/MSS below 1 GHz. (WAC/025(22.05.98))*~~

ISSUE: Additional ~~Allocations~~ allocations to NVNG MSS in the 450-470 MHz band.

BACKGROUND: The position of the incumbents in this band is that the NVNG MSS industry did not adequately demonstrate that sharing in the 450-470 MHz band is possible. It is the view of the NVNG MSS industry that the provision of land mobile systems' technical parameters and participation of incumbent users is required to demonstrate that sharing is feasible.

PRELIMINARY VIEW: The feasibility of MSS and land mobile sharing in the 450-470 MHz band requires further study. Based on the results of studies being conducted, the U.S. will determine whether to pursue MSS allocations in this band.

WRC-00 Agenda Item 1.13: *on the basis of results of the studies in accordance with Resolutions 130(WRC-97), 131(WRC-97), and 538(WRC-97):*

1.13.1: *to review and, if appropriate, revise the power limits appearing in Articles **S21** and **S22** in relation to the sharing conditions among non-GSO FSS, GSO FSS, GSO broadcasting-satellite service(BSS), space sciences and terrestrial services, to ensure the feasibility of these power limits and that these limits do not impose undue constraints on the development of these systems and services;*

1.13.2: *to consider the inclusion in other frequency bands of similar limits in Articles **S21** and **S22**, or other regulatory approaches to be applied in relation to sharing situations;*

ISSUE: Regulatory and technical provisions to enable sharing among non-GSO FSS, GSO FSS, GSO BSS, space sciences and terrestrial services.

BACKGROUND: WRC-97 adopted provisional power flux density limits in certain frequency bands which would apply to non-GSO FSS systems to protect GSO FSS networks, terrestrial services, and GSO BSS networks. Resolution 130 (WRC-97), *Use of Non-Geostationary Systems in the Fixed-Satellite Service in Certain Frequency Bands* and Article S22.2 of the Radio Regulations contain limits corresponding to an interference level caused by one NGSO system in the frequency bands 10.7-12.75 GHz, 17.8-18.6 GHz, and 19.7-20.2 GHz. Resolution 131 (WRC-97), *Power Flux-Density Limits Applicable to Non-GSO FSS Systems for Protection of Terrestrial Services in the Bands 10.7-12.75 GHz and 17.7-19.3 GHz*, and Article S21 contain limits to protect terrestrial service. Resolution 538, *Use of the Frequency Bands Covered by Appendices 30 and 30A by Non-GSO Systems in the Fixed-Satellite Service*, and Article S22 contain limits corresponding to an permissible levels of interference level from a NGSO system into a GSO BSS network. These limits are provisional, subject to review by ITU-R and confirmation by WRC-00.

PRELIMINARY VIEW:

The U.S. continues to review the provisional power limits with the intent of protecting the GSO FSS, GSO BSS, space sciences, and terrestrial services while allowing the introduction of NGSO FSS systems.

There will be a need for an alternative approach to facilitate sharing in some specific situations. The provisional epfd limits and associated time allowances do not adequately protect existing GSO FSS networks with large earth station antennas (large earth station antennas will be defined as a result of technical work within the ITU-R). The U.S. favors coordination between NGSO FSS networks and these GSO FSS networks.

Earth stations operating in the 13.75-14.0 GHz band are technically constrained by S5.502 (minimum size of 4.5 meters; e.i.r.p. between 68 and 85 dBW), S5.503 (e.i.r.p. density in the band 13.772-13.778 MHz), and S5.503A (FSS shall not cause harmful interference to NGSO space stations in the space research and Earth exploration-satellite services until January 1, 2000). In addition, there are ITU-R Recommendations (e.g., ITU-R S.1068 (Fixed-satellite service and radiolocation/radionavigation services sharing in the band 13.75-14.0 GHz) and ITU-R SA.1071 (Use of the 13.75 to 14.0 GHz band by the space science services and the fixed-satellite service))

that describe sharing situations with the fixed-satellite service, including recommended limitations on the FSS. These footnotes and recommendations will have to continue to be applied to both GSO and NGSO systems operating in the band.

Characteristics of radars currently operating in the bands 13.75-14.0 GHz have been examined. Radars operating in the 13.75-14.0 GHz band employ e.i.r.p. values of up to 79 dBW. Interference from these radiolocation stations to NGSO FSS networks would appear to be probable and sharing may not be feasible.

Characteristics of radars currently operating in the band 17.3-17.7 GHz have been examined. Radars operating in the band 17.3-17.7 GHz employ e.i.r.p. values up to 115 dBW. Sharing was found to be feasible with GSO FSS systems (Earth-to-space) if the radiolocation stations limit their emissions toward the geostationary orbit. Sharing would not appear to be feasible between radiolocation stations and NGSO FSS networks.

Sharing with satellite systems in quasi-geostationary satellite orbit needs to be considered within this agenda item.

WRC-99 Agenda Item 2: *to examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations which have been communicated by the 1999 [2000] Radiocommunication Assembly, in accordance with Resolution **28 (WRC-95)**; and decide whether or not to update the corresponding references in the Radio Regulations, in accordance with principles contained in the Annex to Resolution **27 (Rev.WRC-97)**;*~~Resolution 27 (WRC-97) - *To examine the revised ITU-R Recommendations incorporated by reference in the Radio Regulations which have been communicated by the 1999 Radiocommunication Assembly, in accordance with Resolution 28 (WRC-95); and decide whether or not to update the corresponding references in the Radio Regulations. (WAC/026(22.05.98))*~~

BACKGROUND: A number of provisions of the Radio Regulations make reference to the ITU-R Recommendations. As the ITU-R Recommendations are updated, it is necessary to review the Radio Regulations to see if these references should be continued.

PRELIMINARY VIEW: The U.S. has examined every reference to an ITU-R Recommendation within the Radio Regulations. ~~Our preliminary view is that, i~~In each case, action is contemplated which will conclude the effort, under way since the Voluntary Group of Experts, to use incorporation by reference wherever ~~it makes sense~~the provision is mandatory and the specific recommendation version is cited.

INTERNATIONAL TELECOMMUNICATION UNION

RADIOCOMMUNICATION STUDY GROUPS

Revision 1 to Document 1/23-E
Munich, 16 July 1998
Original: English only

Task Group 1/5

DRAFT PROPOSED TEXT FOR THE DRAFT CPM REPORT TO WRC-2000

AGENDA ITEM 1.2

In considering Recommendation No. 66(Rev. WRC-97), "Studies of the Maximum Permitted Levels of Unwanted Emissions," and in particular its *recommends* 1., 2. and 6, ITU-R [Task Group 1/5 has agreed][1] the attached Annex as its contribution to the Conference Preparatory Meeting (CPM) for WRC-2000. The attachment addresses (i) space services spurious emission limits and how they are applied, (ii) radiodetermination (radar) spurious emission limits that may be interpreted in different ways in Appendix S3, (iii) the limiting case of a very narrowband or unmodulated signal in a wideband amplifier, (iv) the special case of application of spurious emission limits in adjacent transponders within the same transmitting system, (v) amateur earth stations operating below 30 MHz, and (vi) an exemption from spurious emission limits for deep space satellites.

Studies within Task Group 1/5 emphasize the need for further studies, both on a general and on a band-by-band basis, of spurious emissions limits so as to better protect passive services including radio astronomy, and safety services.

It is noted that some additional CPM texts are likely to be proposed during the next TG 1/5 meeting in January 1999, following the conclusions of on-going studies.

DRAFT PRELIMINARY PROPOSED TEXT FOR THE DRAFT CPM REPORT TO WRC-2000

1 WRC-2000 Agenda Item 1.2 - (relative to Recommendation 66(Rev.WRC-97), "Studies of the Maximum Permitted Levels of Unwanted Emissions)

1.2 to finalize remaining issues in the review of Appendix S3 to the Radio Regulations with respect to spurious emissions for space services, taking into account Recommendation 66(Rev.WRC-97) and the decisions of WRC-97 on adoption of new values, due to take effect at a future time, of

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[1] This draft CPM contribution is considered to be in square brackets in its entirety. It will be discussed at the January 1999 meeting of Task Group 1/5 with the intention of finalizing the text for submission to the editing group preparing the draft CPM Report for presentation to the Conference Preparatory Meeting.

spurious emissions for space services. Although not specifically defined in Article S1 of the Radio Regulations, the term "space services" is taken to be any service which uses "*Space Radiocommunication*" as is defined in Article S1.

2 Summary of Technical Studies

2.1 Appendix S3 of the ITU Radio Regulations contains tables of maximum permitted spurious emission power levels. Table I contains the current values, while Table II applies to transmitters installed after 1 January 2003 and to all transmitters after 1 January 2012. Note 14 of Table II identifies the spurious emissions limits for space services as "design objectives" until after WRC-2000.

2.2 In response to liaison statements, the ITU-R Working Parties 4A (FSS applications) and 8D (MSS applications) have taken the position that they saw no further need for the "design objectives" qualification for space services limits and that, at this time they believe that no changes to the attenuation values or the reference bandwidth for space services are applicable.

2.3 Appendix S3 also includes a paragraph addressing measurement methods for radar systems. The inclusion of this paragraph under Section I, however, implies that the current spurious emission limits also apply to radar systems. In a liaison statement to Task Group 1/5, Working Party 8B has recommended changes to Appendix S3 that would indicate that spurious emission limits apply to radar systems only under Section II. Studies within Task Group 1/5 have reached the same conclusion.

2.4 Working Party 8B requests modification of Section II of Appendix S3 to indicate that spurious emission levels for radar systems should be based on radiated emissions, and not measured at the transmission line. This would ensure that the measured spurious emission levels account for the inherent selectivity of certain radar antennas. Studies within Task Group 1/5 have reached the same conclusion.

2.5 Studies within Task Group 1/5 indicate an anomaly in Appendix S3 for amateur earth stations. Amateur earth stations use the same transmitting equipment as amateur stations, both below and above 30 MHz, and there is no reason for the same terrestrial-based equipment to be subject to different spurious emission requirements only at the time of transmitting to amateur space stations. Below 30 MHz, amateur stations and amateur earth stations, both operating in the amateur service, use 43 + 10 log(PEP), or 50 dB, whichever is less stringent in determining the applicable spurious limit. Above 30 MHz, Appendix S3 currently requires amateur earth stations to fall into the "All services" category of Table II, viz., up to 70 dBc suppression, which causes amateur earth stations to have more restrictive limits than other earth stations. Furthermore, longer-term studies within Study Group 8 should address the appropriate use of spurious emission spectral density limits (dBs) in this case as an alternative to dBc, as some amateur earth stations use SSB emissions. A new footnote in Table II applied against "Space services (earth stations)" would be appropriate for such case.

2.6 Studies within Task Group 1/5 have shown the difficulty with very narrowband or unmodulated space service signals, and with spurious emissions from one transponder that fall into a companion, second transponder within the same amplifying system. Separate self-explanatory Headnotes 11bis and 11ter to Appendix S3 have been proposed to cover these cases.

2.7 Studies within Task Group 1/5 have concluded that there is no reason for *Deep Space* spacecraft, as defined by the ITU Radio Regulations, to have any spurious emission limits. An exemption for these spacecraft is proposed.

3 Analyses of Results

3.1 Task Group 1/5 has addressed the issue of spurious emission limits for space services, with the intent of investigating the feasibility of providing additional protection for safety services and passive services such as radio astronomy, and the impact on all concerned services. In its studies, Task Group 1/5 considered modifications to both the "design objectives" levels and to the reference bandwidth. Based on conclusions from relevant space service working parties and other extensive contributions to the studies within the Task Group, it is recommended that WRC-2000 review Appendix S3 taking into account the considerations given in Section 5, below.

3.2 With respect to the radiodetermination issue, Task Group 1/5 concludes that WRC-97 did not intend to include radar systems under the spurious emission limits of Section I of Appendix S3. Radar systems had been exempted from the limits in Section I because the required measurement methods had not been determined. The measurement methods now provided in Recommendation ITU-R M.1177 pertain to the spurious emission limits in Section II, which apply to radar transmitters installed after 1 January 2003 and to all radar transmitters after 1 January 2012.

3.3 Task Group 1/5 also agrees that some radar antennas, such as slotted arrays and some distributed phased arrays, have inherent selectivity reducing the level of spurious emissions. For this reason, Appendix S3 should indicate that spurious emissions of radar systems should be based on the radiated field, not the power in the transmission line.

3.4 Task Group 1/5 considered the situation of amateur earth stations which use the same transmitting equipment for communication to both space and terrestrial stations but which currently fall into two spurious emission categories depending on which of these two ways the service is used. A relevant modification to the category of "Space services (earth stations)" in Table II of Appendix S3 is suggested.

3.5 Task Group 1/5 examined the use of *Deep Space* spacecraft which have emissions that are so weak that only unusual communications equipment, using massive antennas and very low noise cooled amplifiers, can detect even the fundamental signal yet alone any spurious emissions. A consequential suggestion is made to exempt such *Deep Space* spacecraft from requirements for spurious emission limits.

3.6 Task Group 1/5 concluded that very narrowband or unmodulated transmissions, where practical application of the term "necessary bandwidth" may be difficult to apply in determining the domain of spurious emissions, needs special treatment. Consideration of appropriate text on this point is suggested.

3.7 Task Group 1/5 addressed a satellite system where a spurious emission from one transponder may fall on a frequency used by another transponder in the same satellite, but where the second transponder has fundamental emissions well in excess of the spurious emission. This situation may deserve treatment by the WRC-2000.

4 Advantages and Disadvantages

Adoption of the spurious emission limits currently included in Appendix S3 for space stations of the space services will provide a general degree of protection for other systems, while not placing an unreasonable burden on the space services given the current state of technology and cost effectiveness of implementing systems. It is recognized that general limits alone are not sufficient to protect certain vulnerable services. Revising the language in Appendix S3 regarding radar systems will correct the implication that radars are subject to spurious emission limits under Section I, and rightly provide for measurement of radar spurious emissions in the radiated field, allowing for

consideration of the benefits of antenna selectivity. Special consideration is necessary for the previously unconsidered amateur earth stations, very narrowband or unmodulated signals, *Deep Space* space stations, and companion transponders operating within the same satellite.

5 Regulatory and Procedural Considerations

5.1 To indicate adoption of the space services spurious emission limits currently designated "design objectives," delete Footnote 14 in Table II of Appendix S3 to the ITU Radio Regulations.

5.2 To correct a possible misunderstanding regarding the applicability of spurious emission limits for radar systems, add a new Headnote No. 6 above Section I to read as follows:

> Radiodetermination (radar) systems are exempt from spurious emission limits until Section II of the revised Appendix S3 comes into effect, i.e., spurious emission limits apply for radar transmitters installed after 1 January 2003 and for all transmitters after 1 January 2012.

5.3 The existing Headnote No. 6 immediately under Section I should be deleted. To indicate that spurious emission levels for radar systems should be determined from radiated emissions, add a new footnote to the "Radiodetermination" service category in Table II of Section II to read as follows:

> Radiodetermination (radar) system spurious emission dB attenuation shall be determined for radiated emission levels, not at the antenna transmission line. The measurement methods for determining the radiated spurious emission levels from the radar systems should be guided by Recommendation ITU-R M.1177.

5.4 To permit the use of these measurement methods indicated in 5.3 above, modify existing Headnote No. 8 of Section II, adding the words "or appropriate" after the phrase "when it is not possible."

5.5 To adequately recognize the case of very narrowband and unmodulated signals, add a new Headnote 11bis to Appendix S3 to read as follows:

> As an emitted signal becomes more and more narrow (to the limiting case of an unmodulated carrier with theoretical necessary bandwidth of zero), the application of the term "necessary bandwidth" as used in determining the region where spurious emission limits apply, becomes more and more difficult. In the limit, +/-250% of necessary bandwidth (generally recognized as establishing the region beyond which spurious emissions are defined), approaches zero. Beacon and other unmodulated signals, such as those used in uplink and downlink circuits in control and tracking of satellites, are examples of a case where it is difficult to practically apply the term "necessary bandwidth" in determining where out-of-band emissions end, and spurious emissions begin. Pending further studies and definitive action by a future World Radiocommunication Conference, in calculating the region where spurious emission limits apply for transmitters using amplifiers to pass essentially an unmodulated signal (or a signal with very small bandwidth), the amplifier bandwidth is taken to be the necessary bandwidth (in calculating the regions where spurious emissions apply).

5.6 To avoid unnecessary design and operational requirements for adjacent transponders in the same transmitting system, add a new Headnote 11ter to Appendix S3 as follows:

> For satellites employing more than one transponder, and when considering the limits for spurious emission as indicated by Headnote 11 to Appendix S3, spurious emission from one transponder may fall on a frequency used by a companion, second transponder and are found there at a level of spurious emission which is well exceeded by fundamental emissions of the

second transponder. This situation is always under control of a satellite designer or system operator who must ensure such spurious emissions cause no intrasystem interference. Limits of Appendix S3 should not apply to those spurious emissions on a satellite which fall within the transponder frequency bands where there are transmissions from the same satellite.

5.7 To avoid amateur earth stations having to comply with spurious emission limits different from amateur stations, add a new footnote in Table II, to the "Space services (earth stations)" category, as follows:

Amateur earth stations operating below 30 MHz are in the service category "Amateur services operating below 30 MHz (including with SSB)."

5.8 To cater for *Deep Space* space stations, defined in the Radio Regulations as those at distances from the Earth equal to, or greater than 2×10^6 km, and which have essentially undetectable spurious emissions in every case, add a new footnote in Table II, to the "Space services (space stations)" category, as follows:

Deep Space space station systems, as defined by Article S1 as beyond 2×10^6 km distance from the Earth, are exempt from spurious emission limits.

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UNITED STATES OF AMERICA

PROPOSAL FOR THE WORK OF THE CONFERENCE

2000 WORLD RADIOCOMMUNICATION CONFERENCE PREPARATION

IWG9/28

DATE: August 5, 1998

Proposal for Agenda Item 1.8

to consider regulatory and technical provisions to enable earth stations located on board vessels to operate in the fixed-satellite service (FSS) networks in the band 3 700-4 200 MHz and 5 925-6 425 MHz, including their coordination with other services allocated in these bands

Background Information:

Global wide-band communication with vessels is possible by using existing satellite transponders of the fixed-satellite service (FSS) and satellite tracking earth stations mounted on stabilized platforms which compensate for the pitch and roll of a moving vessel. Satellite communications in the 3 700-4 200 MHz and 5 925-6 425 MHz bands can provide global coverage without resorting to multiple spot beams that are necessary at higher frequencies. This means of communication is currently being provided on an experimental basis to ships and other vessels using FSS transponders operating in the bands 3 700-4 200 MHz and 5 925-6 425 MHz in all three ITU Regions. To achieve the primary service status of the FSS as specified in this agenda item, technical and regulatory provisions are necessary to effect coordination of this use with other FSS use and with the fixed service (FS). Technical study has been assigned to ITU-R WP 4-9S, and is currently underway. ITU-R Draft New Report 4-9S/AG (Mar. 98) states that there are three phases of operations to consider for the needed provisions: (i) when the vessel is stationary (*e.g.*, tied to a pier, or moored at a fixed spot in the ocean); (ii) when the vessel is in motion on the high seas and (iii) when the vessel is in motion within the coordination distance for terrestrial microwave. For the stationary phase (when the vessel supporting the earth station is not moving) the usual coordination methods for the FSS apply, and no further regulatory language or technical criteria to effect sharing are required. When the vessel is at sea, no coordination is deemed necessary if it is a sufficient distance offshore so as to preclude harmful interference with land-based FS operations. This distance is yet to be determined, but in the U.S. this distance is 100 km. For the in-motion phase within the coordination distance of terrestrial microwave, a method to effect coordination is needed. Such method must include a means to assess the sharing situation with other deployed primary allocated services. ITU-R Draft New Report 4-9S/AG contains a method for identifying the "critical contour point" ("CCP") of earth stations onboard moving vessels with respect to terrestrial FS stations within coordination distance. This methodology identifies the worst case point of potential interference between an earth station onboard a moving vessel and each terrestrial FS station coming within its coordination area by considering several factors, including, *inter alia*, terrain blockage, transmission power and antenna gain (mainbeam and sidelobe). The CCP methodology employs the criteria set forth in Recommendations ITU-R IS.847 and SF.1006 to ensure protection of FS stations. The applicability of these criteria to operations of earth stations onboard moving vessels is under discussion in U.S. WP 4-9S. On 21 July 29, 1998, a new document was introduced which contained a methodology for derivation of the appropriate

interference protection objective to ensure that terrestrial FS stations do not receive harmful interference from earth stations operating onboard vessels. It is expected that the required methodology and protection criteria will be identified in either an approved ITU-R Recommendation or a draft procedure will be available for inclusion in the WRC Resolution to enable these operations. The supporting regulatory provisions are proposed below.

Proposal:

MOD

<table>
<tr><td colspan="3">Allocation to Services</td></tr>
<tr><td>Region 1</td><td>Region 2</td><td>Region 3</td></tr>
<tr><td>3 600-4 200 MHz

FIXED

FIXED-SATELLITE (space-to-Earth) ADD USA//1

Mobile</td><td colspan="2">3 700-4 200 MHz

FIXED

FIXED-SATELLITE (space-to-earth) ADD USA//1

Mobile except aeronautical mobile</td></tr>
<tr><td colspan="3">5 925-6 700 MHz FIXED

FIXED-SATELLITE (Earth-to-space) ADD USA // 1

MOBILE</td></tr>
</table>

Reason: To establish provisions for operations of earth stations onboard vessels in the fixed-satellite service.

ADD:USA//1: Notwithstanding any other provision of the Radio Regulations, an earth station onboard a vessel may communicate as a station in the fixed-satellite service while using that service's transponder(s), transmitting in the band 5 925-6 425 MHz and receiving in the band 3 700-4 200 MHz. Stationary operations will be coordinated and notified in accordance with Articles 11 and 13 [new RR numbers] with all other satellite networks and terrestrial assignments notified in those bands appearing in the Master Register with a favorable finding. Operations [100] km from land and beyond require no coordination but must be advance published on a network basis. Coordination of in-motion operations within [100] km of land will be accomplished on a bilateral basis with affected administrations using the data required by [the above Articles][Article 13]. For purposes of such coordinations, fixed service stations permanently installed in offshore locations shall be considered to be stations on land. In addition, the procedures in [Resolution AAA WRC-2000][ITU-R Recommendation AAA] to establish coordination area(s) for these vessel operations and to assess interference potential to an administration's fixed and fixed-satellite services are recommended for such coordination. In assessing interference potential, sharing criteria in [RR xxx][ITU-R Rec F. xxxx][ITU-R Rec FS. xxxx] may be used.